3rd Harmonic Monday Meeting Minutes

Date: August 7, 2006
Time: 9:30 A.M.
Place: Trailer 157 Conference Room

Attendees (P=Present):

C. Antoine		C. Cooper		E. Harms	P	A. Rowe	P
T. Arkan	P	N. Dhanaraj	P	T. Khabiboulline	P	N. Solyak	
L. Bellantoni		H. Edwards	P	D. Mitchell	P	W-D Moeller	P
C. Boffo	P	M. Foley	P	D. Olis	P	G. Wu	
H. Carter	P	C. Ginsburg	P	P. Pfund			

Minutes recorded by Dan
Minutes are posted at: http://tdserver1.fnal.gov/dolis/39GHz_minutes.html
3.9GHz Project page is: www-a0.fnal.gov

Meeting Minutes
Helen attended by phone from DESY.

HOM bodies

- Wolf-Dietrich discussed F-probe failure while at Cornell. A test was performed on weld samples created under very poor control conditions to purposely contaminate material. Sample stayed ductile at room temperature. Conclusion supports current thinking that failure occurred while cold (<20K). W-D's minutes from this meeting are attached.
- It is speculated that local heating of F-probe was caused by multipacting. A severe temperature gradient could result in thermal stresses that lead to failure. What gradient is required to achieve brittle fracture? Timer reports Salman Tariq (AD) is working on ANSYS model of F-probe to understand possible temperature gradients/stress levels in the material that caused failure.
- Timer completed recalculation on copper cavity and believes test of new probe design in copper cavity is valid. Don M. will work on design of rotatable flange to connect HOM body to copper cavity. Will this cavity be used for test of main coupler antenna coupling? Cavity to coupler flange detail needs to be looked at.

Cavity-3 fabrication

- M. Foley reports he shipped a weld fixture to JLAB for final welds. Expect cavity to be complete in 2weeks.
- Allan Rowe will formalize inspection plan to study condition of F-probes during cavity processing.
- Field probes will be installed in cavity during next vertical test to look for changes in RF resonance that might show F-probe failure.

Cavity-1 repair

- M. Foley now has a fixture design that will rotate the cavity around HOM body to perform weld of cap onto damaged HOM body. Tooling will be in shop shortly.

Input Couplers

- Dan reports that QC continues. Summary of measurements on all six Cold End Assemblies is complete. One Waveguide Assembly is found to leak in the weldment of the pillbox window. Calls not yet returned from CPI. W-D Moeller reports that CPI has been on a 2-week shutdown. Cornell rec'd two TTF-3 type power couplers and they show similar defects in copper plating as

Dan reported last week. ADDENDUM: I rec'd email from CPI after meeting. I've sent photographs of plating defects. CPI says they'll do whatever they can to rectify our concerns.

Other Business

- HOM Couplers antenna diameter incorrectly toleranced which is causing improper fit with connector. Don M. will correct.
- HPR modifications underway: smaller wand diameter and length (to provide improved clearance in cavity), new drive sprocket and chains for cavity motion (to replace nylon belt).
- Elvin reminds everybody to provide him SWF requirements for next two months by end of the day.

W-D Moeller's minutes from Cornell meeting:

Discussion minutes on 3.9 GHz HOM F-part breaks, Aug, 4th 2006

Cornell University, SRF
Curtis Crawford, Rong-li Geng, Hasan Padamse, James Sears, Wolf-Dietrich Moeller

1. A tests was performed on e-beam welds on 'not clean' Nb parts:

    a. Two times two Nb parts from the 'left over'-shelf welded together (no cleaning, no BCP, welding length ~70mm)
    b. Venting <30sec after welding with 1. N2, 2. air
    c. Bending test at 90° => ductile behavior

Conclusion: brittleness of material is not big enough after bad welding procedure for a fracture at room temperature

2. Presumption:

Multipacting heats only the F-part up to >>70K and the HOM can stays at <20K. At this temperature difference, the thermal expansion might be big enough to build up a force to cause a break at a brittle part of the F-part.
Length contraction between RT and 4K for Nb = 0.15%;
i.e. 3/100mm on a 20mm long distance.

3. Questions:
    a. What was the power applied to the cavity during the cold test?
    b. How long?
    c. Is this power sufficient to warm up the F-part to RT while the HOM coupler can and the broken part of the F-part is still at <20K (=brittle)?
    d. Is the thermal expansion of 1.5 ‰ big enough?
    e. ANSYS simulation should be done.